

IN THE CLAIMS

Please amend the claims as follows.

1. (Currently Amended) An electronic assembly system comprising:
a substrate having at least one hole therein;
a heat sink having at least one mounting pin; and
at least one heat-producing component attached to the substrate[[,]];
a thermal interface material disposed between the heat sink and the heat-producing component;

a heat source operatively coupled for a predetermined time to at least the at least one mounting pin to effect substantially simultaneous attachment of the at least one mounting pin to the substrate and attachment of the thermal interface material to the heat sink and to the heat-producing component;

wherein the heat sink is disposed over the at least one heat-producing component and the substrate, wherein the heat-producing component is sandwiched between the substrate and the heat sink, wherein a the thermal interface material is disposed between the heat sink and the heat-producing component to couple the heat sink to the heat-producing component, and wherein the at least one mounting pin of the heat sink is soldered into the at least one hole of the substrate.

2. (Previously Presented) The electronic assembly of claim 1, wherein the at least one mounting pin is straight and cylindrical and is wave-soldered to attach the heat sink to the substrate and to preheat and couple the heat sink to the heat-producing component with the disposed thermal interface material.

3. (Previously Presented) The electronic assembly of claim 1, wherein the heat sink further comprises:

a thermally conductive plate, wherein the heat-producing component has front and back sides, the front side being disposed across from the back side, wherein the thermally conductive

plate is coupled to the back side and the substrate is attached to the front side, and wherein the at least one mounting pin extends beyond the thermally conductive plate and the at least one mounting hole.

4. (Previously Presented) The electronic assembly of claim 3, wherein the heat sink further comprises:

a heat exchange portion, wherein the heat exchange portion extends beyond the thermally conductive plate and is disposed across from the heat-producing component.

5. (Previously Presented) The electronic assembly of claim 4, wherein the heat exchange portion comprises:

multiple fins extending away from the thermally conductive plate.

6. (Previously Presented) The electronic assembly of claim 3, wherein the thermal interface material is disposed between the heat sink and the back side of the heat-producing component.

7. (Previously Presented) The electronic assembly of claim 6, wherein the thermal interface material is selected from the group consisting of a phase change thermal interface material and a thermal grease.

8. (Previously Presented) The electronic assembly of claim 3, wherein the substrate is electrically and/or mechanically attached to the front side of the heat-producing component.

9. (Previously Presented) The electronic assembly of claim 1, wherein the heat sink is made from a material selected from the group consisting of copper and aluminum.

10. (Previously Presented) The electronic assembly of claim 1, wherein the heat-producing component is an integrated circuit device selected from the group consisting of a chipset, a microprocessor, a digital signal processor, and an application-specific integrated circuit device.

11. (Previously Presented) The electronic assembly of claim 1, wherein the substrate is a printed circuit board.

12. (Previously Presented) The electronic assembly of claim 1, wherein the at least one mounting pin is disposed in the at least one mounting hole and wave-soldered during a pre-assembly operation.

13. (Currently Amended) A method comprising:

mounting a heat-producing component to a substrate having at least one hole therein; positioning a layer of thermal interface material onto the heat-producing component; aligning a heat sink including at least one mounting pin over the thermal interface material such that the thermal interface material is sandwiched between the heat-producing component and the heat sink, and further the at least one mounting pin is disposed over the substrate for soldering the at least one mounting pin to the substrate;

reducing the viscosity of the thermal interface material by preheating the thermal interface material in a pre-heater of a wave soldering machine to cause the thermal interface material to wet the heat-producing component to thermally couple the heat sink to the heat-producing component; and

attaching the heat sink in a fixed position on the heat-producing component and the substrate by soldering the at least one mounting pin into the at least one hole of the substrate and to substantially simultaneously heat the thermal interface material to produce the necessary thermal coupling between the heat producing component and the heat sink.

14. (Previously Presented) The method of claim 13, wherein reducing the viscosity of the thermal interface material comprises:

loading the substrate including the heat-producing component, thermal interface material, and the heat sink onto a conveyor of the wave soldering machine; and

preheating the thermal interface material using the preheater to cause the thermal interface material to wet the heat-producing component.

15. (Previously Presented) The method of claim 14, further comprising:
cooling the at least one mounting pin to mechanically fix the heat sink in place.
16. (Canceled)
17. (Currently Amended) The method of claim [[16]] 13, wherein soldering the at least one mounting pin comprises:
disposing the at least one mounting pin of the heat sink through the at least one hole in the substrate; and
wave soldering the at least one mounting pin to the substrate.
18. (Previously Presented) The method of claim 13, further comprising:
forming the heat sink including a thermally conductive plate such that the at least one mounting pin extends beyond the thermally conductive plate.
19. (Previously Presented) The method of claim 18, wherein forming the heat sink further comprises:
forming a heat exchange portion such that the heat exchange portion extends beyond the thermally conductive plate and across from the heat-producing component.
20. (Previously Presented) The method of claim 19, wherein forming the heat exchange portion comprises:
forming multiple fins extending away from the thermally conductive plate.
21. (Previously Presented) The method of claim 13 wherein, in aligning, the heat sink is made from a material selected from the group consisting of copper and aluminum.
22. (Previously Presented) The method of claim 13 wherein, in positioning, the thermal interface material capable of melting at a wave soldering preheat temperature is selected from the group consisting of a phase change thermal interface material and a thermal grease.

23. (Previously Presented) The method of claim 13, wherein mounting the heat-producing component to the substrate comprises:

electrically and/or mechanically coupling the heat-producing component to the substrate.

24. (Previously Presented) The method of claim 13 wherein, in mounting, the heat-producing component is an integrated circuit device selected from the group consisting of a chipset, a microprocessor, a digital signal processor, and an application-specific integrated circuit device.

25. (Currently Amended) A method comprising:

mounting a heat-producing component onto a substrate having at least one mounting hole therein;

aligning a heat sink having at least one mounting pin to the substrate, with the at least one mounting pin inserted into the at least one mounting hole;

positioning a thermal interface material between the heat-producing component and the heat sink; and

using a wave soldering process to cause the thermal interface material to wet and bond to the heat sink and to the heat-producing component and to substantially simultaneously solder the at least one mounting pin to the at least one mounting hole.

26. (Previously Presented) The method of claim 25, further comprising:

forming the heat sink to have a thermally conductive plate, wherein the at least one mounting pin extends beyond the thermally conductive plate.

27. (Previously Presented) The method of claim 26, wherein forming the heat sink further comprises:

forming a heat exchange portion that extends beyond the thermally conductive plate and is disposed across from the heat-producing component.

28. (Previously Presented) The method of claim 27 wherein, in aligning, the heat sink is made from materials selected from the group consisting of copper and aluminum.
29. (Previously Presented) The method of claim 25 wherein, in positioning, the thermal interface material capable of melting at a wave soldering preheat temperature is selected from the group consisting of a phase change thermal interface material and a thermal grease.
30. (Previously Presented) The method of claim 25 wherein, in mounting, the heat-producing component is an integrated circuit device selected from the group consisting of a chipset, a microprocessor, a digital signal processor, and an application-specific integrated circuit device.
31. (Currently Amended) A method comprising:
- positioning a layer of thermal interface material on a heat sink having at least one mounting pin;
- mounting a heat-producing component to a substrate having at least one hole therein;
- aligning the heat sink over the heat-producing component such that the thermal interface material is sandwiched between the heat-producing component and the heat sink, and further such that the at least one mounting pin is disposed for soldering to the substrate;
- reducing the viscosity of the thermal interface material by preheating the thermal interface material in a pre-heater of a wave soldering machine to cause the thermal interface material to wet the heat-producing component to thermally couple the heat sink to the heat-producing component; and
- attaching the heat sink in a fixed position on the heat-producing component and the substrate by soldering the at least one mounting pin into the at least one hole of the substrate while continuing to heat the thermal interface material to produce the necessary thermal coupling between the heat producing component and the heat sink.
32. (Previously Presented) The method of claim 31, wherein reducing the viscosity of the thermal interface material comprises:

loading the substrate including the heat-producing component, thermal interface material, and the heat sink onto a conveyor of the wave soldering machine; and

preheating the thermal interface material using the preheater to cause the thermal interface material to wet the heat-producing component.

33. (Previously Presented) The method of claim 32, further comprising:
cooling the at least one mounting pin to mechanically fix the heat sink in place.

34. (Previously Presented) The method of claim 31, wherein soldering the at least one mounting pin comprises:

disposing the at least one mounting pin of the heat sink through the at least one hole in the substrate; and

wave soldering the at least one mounting pin to the substrate.

35. (Previously Presented) The method of claim 31, further comprising:
forming the heat sink including a thermally conductive plate such that the at least one mounting pin extends beyond the thermally conductive plate.

36. (Previously Presented) The method of claim 35, wherein forming the heat sink further comprises:

forming a heat exchange portion such that the heat exchange portion extends beyond the thermally conductive plate and across from the heat-producing component.

37. (Previously Presented) The method of claim 36, wherein forming the heat exchange portion comprises:

forming multiple fins extending away from the thermally conductive plate.

38. (Previously Presented) The method of claim 31 wherein, in aligning, the heat sink is made from a material selected from the group consisting of copper and aluminum.

39. (Previously Presented) The method of claim 31 wherein, in positioning, the thermal interface material capable of melting at a wave soldering preheat temperature is selected from the group consisting of a phase change thermal interface material and a thermal grease.

40. (Previously Presented) The method of claim 31, wherein mounting the heat-producing component to the substrate comprises:

electrically and/or mechanically coupling the heat-producing component to the substrate.

41. (Previously Presented) The method of claim 31 wherein, in mounting, the heat-producing component is an integrated circuit device selected from the group consisting of a chipset, a microprocessor, a digital signal processor, and an application-specific integrated circuit device.